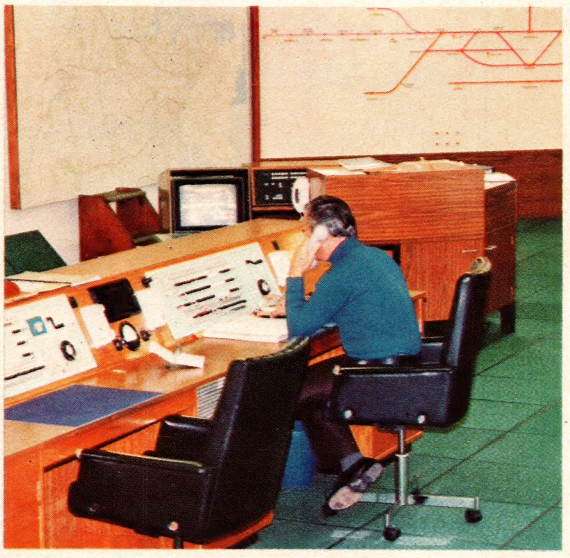
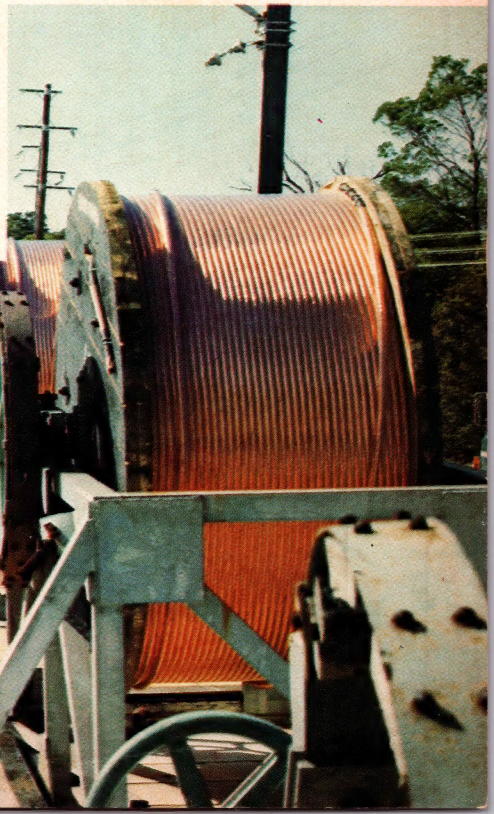
Railways of Australia

NETWORK

Vol. 16 No. 6 August 1979 Price: 60 cents





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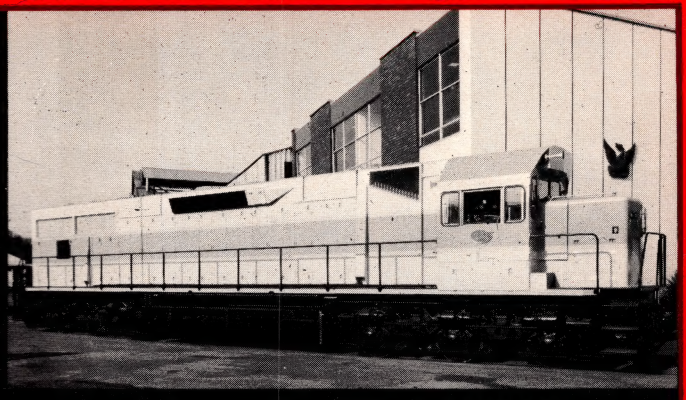

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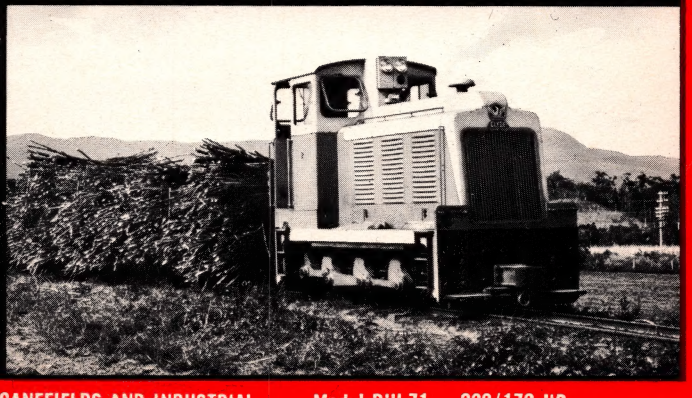

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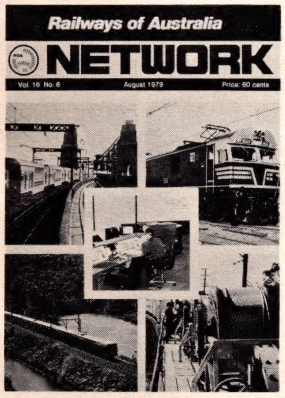
Railways of Australia

NETWORK

Vol. 16 No. 6 August 1979



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- Australian National Railways
- Public Transport Commission of New South Wales
- Queensland Railways
- Victorian Railways
- Western Australian Government Railways

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CONTENTS

OUR COVER

New double-decked trains, new electric locomotives, more electrified lines and an overall modernisation of its electrical system have focused attention on the Public Transport Commission's electric train services.

Network Price Increase

As from this issue, the cover price of *'Network'* will be 60c. The subscription rate (in Australia) remains at $8.50.


T4101


T4101
GOMINAN

Railways of Australia
NETWORK

Are We at the Industrial Crossroads?

As newly emerging influences dominate the market place, the industrial laissez-faire of the past quarter of a century may well be drawing to a close.

In the North West of Australia — the Pilbara — events in recent eeks have focused attention on what could become a growing national problem. The suppliers of labour have been endeavouring to negotiate new agreements with employers, involving financial increases at a time when the world demand for their products is falling. In this case, the decline in world markets highlighted by Japan's 30% lower steel production in 1978 is of major concern to the Pilbara's four iron-ore producers.

Already there have been indications of unprecedented bargaining when Japan's representatives renegotiate the agreements for the annual Australian shipment of five million tonnes of iron ore — for the present agreements terminate in late 1980. Japan has also made it known that 70% of current volume only will be likely to attract a fixed price when contracts are renewed.

When any management is placed in this predicament, the negotiation of new agreements in the only variable area of production — labour — must inevitably result in hard bargaining and possibly lessening job availability if production declines.

Across the Pacific, President Carter has also warned of factors which could lead to recession in the United States.

Parallels for the Pilbara situation do exist in Australia's government-owned railway systems. The dominating market forces differ — Japanese steel-makers are replaced by the hundreds of customers consigning freight, and the tens of thousands of passengers who travel by trains every day.

The competition in the freight area is clearly defined — and our greatest competitor for passenger traffic is the ubiquitous private car. As we move into the eighties and developing fuel crisis, railways performance will be the criteria deciding our viability for the next generation.

During this period basic resources in Australia will need to be utilised to the benefit of the consumer. It is true that we possess over 7% of the world's coal, and vast subterranean resources of natural gas and liquefied petroleum gas . . . not to mention 20% of the world's uranium.

But how are we collectively planning to harvest this treasure in an energy conscious world? We all know we can produce 70% of our crude oil requirements, but for how long?

The alternative resources available can provide incentives for greater application of electric power for Australian industry generally and for the railways of Australia in particular. The conversion of coal and gas to electricity requires both advanced technology and substantial investment, but the dividends can be great as our fossil fuel problems gather momentum and produce increasing industrial trauma.

This problem will assume far greater dimensions from 1983, so our experts tell us, when Bass Strait oil production is expected to decline rapidly.

What of the role of the railways of Australia?

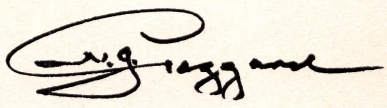
We are in an advantageous situation. Increasing government investment in electrification, the permanent way and rolling stock, combined with fuel problems for the motorist and road transport operators, must attract more passengers and freight consignments to public transport.

These are our "plusses" in the transport equation.

We must endeavour to avoid the "minus" factors of industrial unrest and personal ambition, for these inevitably lead to erosion of public confidence. We must avail ourselves of the opportunity to progress — and settle our differences, where they arise, speedily and amicably.

We can restore public confidence in railways, and we have the opportunity to do so each day, every tomorrow, week by week into the future, as we approach the critical eighties.

It's up to us. All of us.



NEVILLE J. GAZZARD
Executive Director

From the Executive Director's Desk

Mr W. Howard-Smith, Chairman of the Board of A. Goninan & Co. Ltd; the Hon. Peter Cox, N.S.W. Minister for Transport; and Mr A. Reiher, Chief Commissioner, Public Transport Commission of N.S.W., at the handing over of stainless-steel, double-deck, suburban rail cars (see page 11). Above: Trailer Car, T4101.


55

"8501" — the most powerful locomotive built in Australia and the first of ten for the PTC at a total cost of $9.3 million.

Modernising and Extending the N.S.W. Electrified Rail Network

The opening of the Eastern Suburbs Railway, current electrification projects and the introduction of Australia's most powerful locomotive have focused attention on Public Transport Commission electric train services.

The City of Sydney and its environs have long been well-served by an extensive network of electrified commuter rail lines. Suburban and interurban trains carry about 75 per cent of all passenger traffic in and out of the central business district of Sydney in the morning and evening peak hours. This amounts to about half a million passenger journeys each week-day, and requires the operation of about 1,500 passenger train services.

The first electric trains ran in Sydney in 1926 and the system, which uses a 1,500V DC overhead catenary, has been extended over the years to Gosford (80 km to the north), to Lithgow (150 km to the west), to Campbelltown (56 km to the south-west), and to Loftus (30 km to the south). In addition, there are many cross links making up an extensive network which now totals 1,270 km of electrified line.

With the growth of the city and its surrounding satellite towns, and expansion of our coal export market, further extensions to the electrified system have become necessary.

The 10 km $168 million Eastern Suburbs Railway was opened on 23 June 1979, and the electrified network is now being further extended on the Illawarra Line to Waterfall, and north from Gosford to Newcastle.

Extensive operating experience has brought about many refinements in the design of transmission and lineside equipment, and the present system is now being modernised.

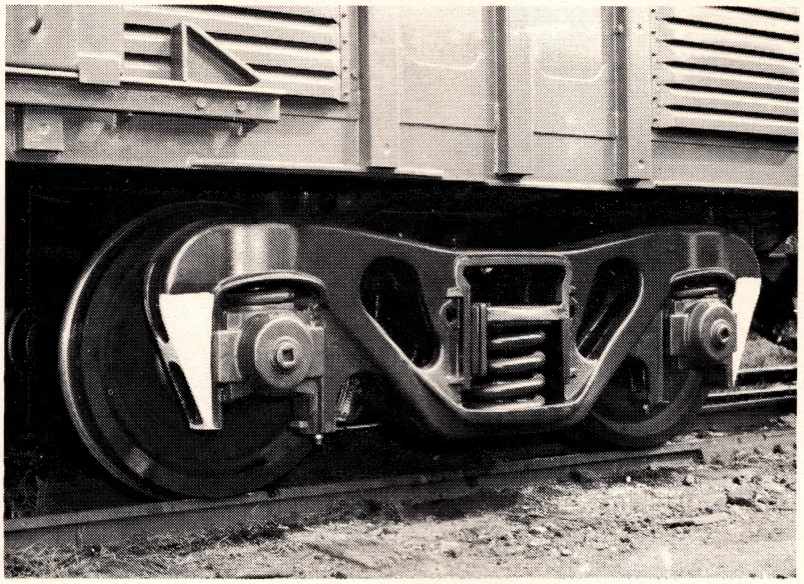
The old fleet of electric locomotives is being rebuilt and additional locomotives are under construction to increase the PTC's capacity to haul both passenger and freight trains.

The PTC has been engaged for some time on a multi-million dollar modernisation programme of its

Opposite: A PTC electric train crosses the Hawkesbury River bridge (above); a double-decked surburban train on the Sydney Harbour bridge (below).

Mr. E. R Gordon (right), PTC Commissioner, accepting "8501" from COMENG.

SPRINGS FOR RAILWAY ROLLING STOCK.



Fast freight bogie with Pioneer Springs and Wear Plates as supplied to the New South Wales Public Transport Commission.

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Pioneer supplies springs and wear plates for the fast freight bogies and locomotive suspension units that are used to transport goods and passengers over mainline tracks at speeds up to 125 km/hr. Pioneer's reputation for reliability has spread all over the world. Transport engineers everywhere rely on the consistent high quality of Pioneer springs for suspension units.

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The Southern Aurora, Sydney-Melbourne Express, fitted with springs supplied by Pioneer.

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suburban rail fleet, and has now acquired well over 400 double-decked cars which give improved performance and carrying capacity. Many additional double-decked units are on order under current contracts.

Electrification Advantages

At a time when conservation of fuel resources and protection of the environment are so vital to the nation's future, the undoubted benefits of electrification become even more appreciated.

Electric units are less harmful to the environment. Being invariably quieter and with no smoke emission, the passing of an electric-powered train causes little disturbance. Furthermore, there are no problems with oil fuel storage and oil waste disposal at depots operating electric units.

It has been a commonly-held view that the cost of electric energy for traction has always been cheaper than diesel fuel. However, the cost benefit in favour of electric power has only become apparent in very recent times, and even greater savings will be achieved with the anticipated future increases in fuel costs.

In 1974, diesel fuel cost 2.4 cents per litre, while electric energy cost 2.05 cents per kilowatt-hour. Average figures for the PTC to move a load of 1,000 tonnes over one kilometre are 27.5 kilowatt-hours of electrical energy, and 7.5 litres of diesel fuel. Therefore, fuel cost for electric traction based on these figures was approximately 56 cents per 1,000 tonne-kilometres, as against 18 cents for diesel traction per 1,000 tonne-kilometres.

But increases in the cost of oil are reversing this relationship. Cost ratios have recently become 66 cents per 1,000 tonne-kilometres for electric traction, compared with 60 cents for diesel traction. And with the 14.5 per cent increase in oil cost for 1979 announced by the OPEC Conference, the cost of diesel traction fuel becomes 69 cents per 1,000 tonne-kilometres — three cents more than present electric traction costs for the same haul.

In time, oil costs are expected to become so high that the huge capital cost of large-scale electrification could be justified on a purely economic basis alone.

However, even disregarding comparative costs, electrification offers many other advantages. When hauling heavy loads on severe grades, such as those unique to New South Wales on the Blue Mountains and Central Coast routes, electric units make better use of their short-time rating by drawing more power from the overhead supply, and consequently climb the mountains faster. Conversely, diesel units are limited to the power of the engine installed. Thus, where a track route involves considerable hill climbing, faster timetables can be run with electric units than with diesel units of similar nominal power.

Another advantage is regenerative braking on the PTC's electric locomotives which provides for energy to be fed back into the overhead wiring for use by other trains.

Eastern Suburbs Railway Opened

Undoubtedly the most important electrification development in New South Wales in recent times was the opening earlier this year of the new Eastern Suburbs Railway, which was reported in detail in the June 1979 issue of *Network*.

Apart from completion of the City Circle loop through Circular Quay in 1956, the 10 km Eastern Suburbs Railway was the first new passenger-carrying line to be opened in New South Wales for more than forty years.

A shuttle service of sleek double-decked electric trains now carries thousands of passengers each day on Australia's most modern mass transportation system.

Many buses terminate at the Bus/Rail Interchange stations of Bondi Junction and Edgecliff, thus conserving fuel, relieving road congestion, and assisting to reduce Sydney's noise and air pollution levels.

Many other benefits and features of this latest addition to the PTC's electrified network were outlined in *Network*, September 1978 and June 1979 issues.

More Electrified Lines

The PTC's already extensive electrified network of 460 route km is being extended by a further 100 km.

On the Illawarra Line, the 13 km section between Loftus and Waterfall is being electrified at a total cost of about $6.5 million and is scheduled for completion by April 1980.

To the north, the main line between Gosford and Newcastle (87 km) is also being electrified, thus linking the two most populous cities in New South Wales with an electric train service.

Completion of these two major projects will bring many benefits. Travellers will appreciate the improved passenger services which will be provided, whilst electrification will be of tremendous assistance in handling the increasing volumes of coal being moved on rail and destined for export overseas.

The Illawarra Line project involves design work, surveys, and provision of a new substation at Heathcote; erection of overhead wiring structures and catenary wires, and installation of new signalling and communications equipment.

To accommodate the longer electric suburban trains, it has also been necessary to extend platforms at Loftus, Engadine, Heathcote and Waterfall.

The Gosford/Newcastle Project, is of much greater magnitude.

Some indication of the huge cost involved in carrying out major

engineering tasks such as this can be gained from the recent estimate of capital expenditure on this project which amounts to $129 million.

This expenditure, which will be spread over about 3½ years, provides for the supply of power, signalling, and all civil engineering works, inclusive of the necessary rolling stock and anticipated escalation.

Good progress has already been made on this massive task. Tenders have been called for the supply of components for new substations; signalling and communications equipment is being ordered, and the erection of steel masts to carry the overhead wiring will start soon.

Track realignment surveys are well advanced and earthworks are in progress at various locations.

Two work trains, each of four specially fitted vehicles, are to be built to speed-up installation of overhead wiring, and plans are being prepared for new overbridges.

The myriad of other tasks involved are being "dovetailed" with military-like precision, and electric trains are scheduled to run between Sydney and Newcastle in 1982.

Australia's Most Powerful Locomotives

Until recently the Public Transport Commission only had one type of electric locomotive, "46" class, of which there are 39. The first went into service in 1956 and since then, they have given excellent service, averaging 150,000 km per year.

The arrival of the "next generation" of electric locomotives began with the delivery of the first of 10 "85" class locomotives on 30 May 1979.

These locomotives, which will cost in all about $9.3 million, are the most powerful units ever built in Australia, with a power rating of 2,700 kW (3,600 hp), as compared to the "46" class units' rating of 2,600 kW (3,400 hp).

The "85" class locomotive, weighing only 120 tonnes, is a relatively light locomotive for its horsepower, and at an axle load of 20 tonnes per axle compares with the iron-ore railway units which operate at 31 tonnes per axle.

The new units are based on Japanese experience with 1,500 volt DC traction combined with a body and bogie arrangement similar to the "442" class diesel-electric locomotives which are well-known for their high hauling ability. Similarity in controls between these two classes makes it easier for drivers changing from one locomotive to the other.

Overhead wiring work on the Illawarra line is expedited by the use of a special work train.

The new locomotives have been designed for ease of operation and ease of maintenance, with added comfort for enginemen and many other new features.

One such technological development is wheel slip control which operates automatically to reduce the tractive effort of the slipping wheel set only, whilst maintaining full power to the other axles. This new feature enables locomotives to deliver maximum tractive effort under adverse slippery rail conditions.

The new units have controls with only five notch positions, compared with previous electric locomotives which have controllers with 75 notches to get to full power.

Liberal use has been made of solid state devices in the control circuits of the new "85" class locomotives.

Again, like the "46" class units the new electrics are fitted with regenerative braking. This feeds electrical current back into the overhead wiring for use by other trains. The regenerative brake on the "85" class locomotive is more powerful than the "46" class brake, and this will reduce wear and tear on the trains being hauled.

Particular attention has been given to improved cab layout for enginemen. New cab features include:

- Full airconditioning
- "Bostrom" type seats, which are fully adjustable
- Cooking and refrigeration facilities
- Toilets and wash basins
- Insulation against noise and heat

The new "85" class locomotives now being progressively delivered to the Public Transport Commission will be invaluable, particularly for export coal haulage. Last year the Public Transport Commission hauled 16.4 million tonnes, most of which was for export. The growth of the export market is expected to continue and 50 million tonnes per annum could well be the haulage task for rail by 1986. This coal will come from the Hunter Valley, Western and Illawarra coal fields.

In addition to the 10 "85" class electrics, the Public Transport Commission is also taking delivery of 30 diesel-electric locomotives which cost a total of $22 million.

Australia's Only Double-Decked Cars Popular

The introduction of the nation's first double-decked trailer carriages in 1964 was probably the most revolutionary development ever in Australian rolling-stock design.

It represented a new and enlightened approach to the problem of increasing line capacity in terms of passenger journeys. More carriages per train would have required extensive engineering works in increasing platform lengths and relocating trackwork, as well as extensive modifications to the signalling system. Costs involved in such works would have been enormous.

The undoubted success of our first double-decked trailer cars led to the development of double-

Electric locomotives play a major role in unit wheat train haulage. They will be increasingly busy in the future hauling coal trains to the seaboard.

decked motor carriages. It was originally believed that the design of two-level motor cars was impracticable, because the space under the floor normally occupied by control and ancillary equipment was occupied by the lower passenger deck.

However, skilful development of more compact components enabled them to be fitted in the ends of the carriage roof.

In 1969 four prototype double-decked motor cars were attached to four two-level trailer cars to make history as the first all double-decked electric multiple-unit train to operate anywhere in the world.

In addition to the many refinements in design to improve passenger comfort, the double-decked trains' main feature is the extra seating provided. An 8-car double-decked suburban train has 976 seats as compared to 560 seats on a conventional single-deck unit. This is a substantial increase of 74 per cent!

After extensive trials and "in-service" experience, specifications were prepared for large-scale production of double-decked motor cars, control trailers, and trailer cars.

In addition to deliveries already made, the PTC has current contracts for 150 double-decked carriages being built in Newcastle by A. Goninan and Co. Ltd and a further 50 being constructed by Commonwealth Engineering (NSW) Pty Ltd. When these contracts are completed, more than half of the Sydney suburban fleet will be made up of double-decked carriages.

With a view to further increasing passenger and crew comfort, plans are in hand for the manufacture of a prototype air-conditioned 8-car double-decked train which will then be evaluated in suburban service.

Public address equipment is being fitted progressively to suburban double-decked carriages. The 200 new cars currently being manufactured are being fitted with such equipment, and a $1 million contract was let earlier this year for the installation of PA in over 300 double-deckers already in service.

Another "First"

In 1970 another "first" was recorded for railways in N.S.W. — the first air-conditioned trains in Australia to operate on an interurban route. These were formed by 16 double-decked air-conditioned carriages, which were followed by a further 30 similar carriages ordered in 1976.

These latter cars were generally similar to the first series, but introduced new features, such as PA system, an increase of 30 per cent in air-conditioning capacity and an improved interior finish.

Many Technological Advances

Just as many developments have taken place in designing improved electric locomotives and double-decked carriages, so too have many advances taken place in the techniques of erecting and tensioning overhead wiring, building new substations and providing computer-based supervisory control equipment.

The PTC's entire electrical system is now remotely controlled from one central supervisory console in Sydney. If a circuit-breaker in one of the 100 substations and sectioning huts opens automatically, the supervisory operator is aware of it within three seconds! System diagrams can be displayed in colour on visual display units, and all operations are automatically logged.

Efficient Mass Transportation Carrier

It has been estimated that the transport task performed by the Sydney suburban electrified rail network is equivalent to 90 million road-vehicle trips per annum concentrated into a period of not more than 20 hours per week!

This is a formidable, if not impossible task for Sydney's metropolitan road system to perform and the Public Transport Commission of New South Wales is firmly committed not only to maintaining its electrified rail system, but to modernising and expanding it.

The many improvements now taking place are part of the N.S.W. Government's $1,000 million five-year programme to improve the State's public transport services.

They are certainly welcomed by the people who use PTC rail, bus and ferry services. Last year, metropolitan patronage totalled nearly 388 million journeys, of which about half were made on suburban and interurban electric trains.

Brown's Creek, Lismore, where Armco saved the Richmond River County Council 30% over a poured insitu concrete culvert.

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AM101

New Suburban Rolling Stock for VicRail

A $108.5 million order for new rolling stock, the largest ever made for VicRail, has been awarded to Comeng Holdings' Victorian subsidiary, Commonwealth Engineering (Vic) Pty Ltd, who will supply 300 stainless-steel air-conditioned railway passenger cars — 200 motor carriages and 100 trailer carriages — during the next six years.

They will make up fifty new trains, the biggest rolling-stock contract to be awarded since Clyde Holdings won the contract eight years ago for supply of the present 300 silver-train carriages.

The main contractors, apart from Comeng, are Bradken Consolidated Ltd for bogies and G.E.C. for electrical equipment.

Announcing the acquisition, VicRail's General Manager, Mr Ian Hodges, said that the railways operated on the principle of ordering an entire fleet of carriages at a time instead of just "topping up" an existing fleet. In that way each new order could take advantage of latest designs and engineering advances.

Delivery is to start in 18 months, and as it proceeds, the existing 37 Tait trains, ordered in 1920, will be removed progressively from service.

World trends and the concern for fuel conservation and a clean environment dictate that use of public transport should be encouraged.

This new generation of suburban trains will assuredly provide the comfort, reliability and speed to attract passengers to VicRail's suburban services.

The Victorian Transport Minister, Mr Robert Maclellan, remarking on the new "super trains" said, "they will certainly be a new experience for suburban commuters".

The 50 new-generation trains will consist of two three-carriage units, each able to operate as a separate train in the off-peak periods.

They will be equipped with the most modern operating features to ensure the safety of crew and passengers; and each three-carriage unit will be fitted with a comfortable air-conditioned crew compartment at each end.

The new trains, which have been increased in width from the 9 ft 9 in of the current stainless-steel trains to 10 ft, will have more room and are designed to provide ample seating for passengers. Each 138 m long train will have a maximum passenger capacity of 1,332, with seating for 604.

Fluorescent lighting and fully-sealed double-glazed tinted safety-glass windows will provide a brightly lit interior under all weather conditions. The interior decor will be varied throughout each train and will provide a restful and pleasing atmosphere. Carpeting and special attention to sound-proofing will reduce noise levels in the carriages.

Two self-contained air-conditioning units in each carriage will provide a comfortable temperature level in both summer and winter, a feature which the public are now used to in their homes and cars.

With radio communication between train and base and a public address system fitted through the trains, passengers will be kept informed of details of train running, changes in schedules and other relevant information.

Features of the new trains are power-operated doors, four-wheel cast-steel frame bogies with air spring suspension and four motors per motor carriage.

Multi-function couplings, incorporating train coupler, multiple-unit electric connections and air brake connections are fully automatic, operated from the driving cab.

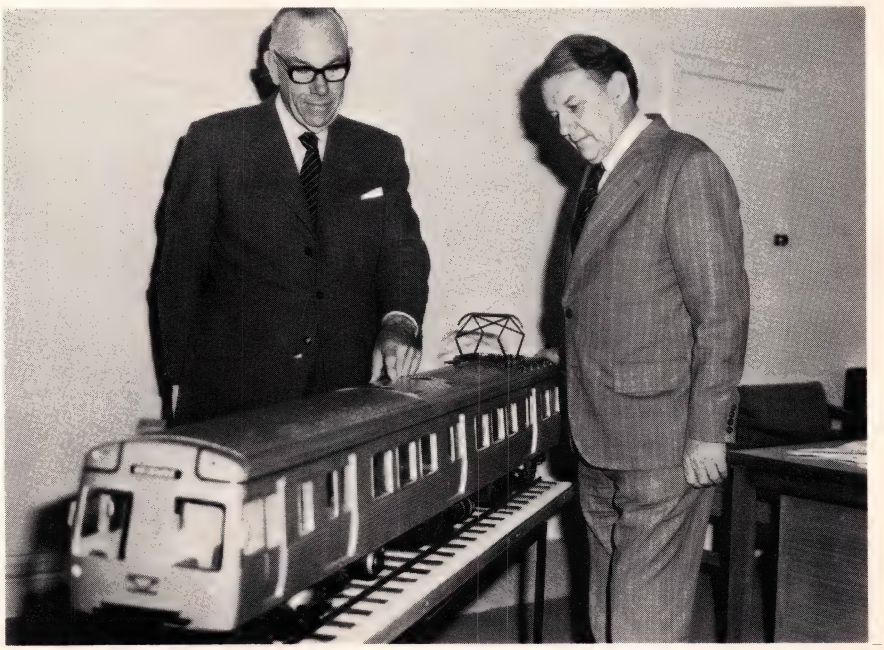
The traction motors will be axle hung and the field windings will be separately excited during rheostatic braking, which will be available from the maximum speed of 115 km/h. The resistances used during starting and rheostatic braking are fan cooled to limit their size and weight.

Each motor car axle will be fitted with wheel spin/slide detection and correction equipment and each trailer car axle will be fitted with wheel slide detection and correction equipment.

The acceleration, rheostatic brake and air brake are load compensated to give constant acceleration and braking for varying passenger loadings.

Each carriage is equipped with an air ride suspension system which also provides the means of controlling the acceleration and braking

(continued on page 30)



VicRail Chairman, Mr A. G. Gibbs (left) and General Manager, Mr I. G. Hodges, examine a model of the new stainless-steel trains. Note the circular air-conditioning vents in the car roof and the pantograph located at the rear.

VicRail Ventures into Pipelines

by I. G. HODGES

Board Member and General Manager, VicRail, and Director, VicRail Pipelines Pty Ltd.

Rail has entered into a new phase of its history with the opening of Phase I of the Altona to Somerton white-oil products pipeline.

VicRail's ability to join the venture started with the passing of some unique pieces of Victorian legislation; the Railways (Participation in Pipelines) Acts of 1975 and 1977, which amended the Railways Act 1958, gave the Board power to subscribe for shares or debentures in pipeline companies or to promote a company or companies to construct, own and operate pipelines on railway and other lands, or to participate in the construction, ownership and operation of pipelines with other pipeline companies.

In August 1977 VicRail promoted VicRail Pipelines Pty Ltd. The company is incorporated under the Victorian Companies Act, with a nominal capital of $10,000 made up of $1 shares and an issued capital of $1,000, being 1,000 shares owned or held in trust for VicRail. The present Directors of VicRail Pipelines Pty Ltd are Mr A. G. Gibbs (Chairman of VicRail), Chairman, Mr L. A. McCallum (Deputy General Manager, VicRail), and myself.

In its first venture VicRail Pipelines Pty Ltd has joined with four major oil companies — B.P. Australia Ltd, Esso Australia Ltd, Mobil Oil Australia Ltd, and the Shell Company of Australia Ltd, in the Altona to Somerton Pipeline. VicRail Pipelines Pty Ltd has a 25% share of the venture and each of the oil companies has an 18.75% share.

The Altona to Somerton pipeline is designed to transport a range of white petroleum products from the Altona Refinery of Petroleum Refineries of Australia and from the Shell Refining Company of Geelong to storage facilities at Somerton. It joins up with the Somerton Terminal and the Somerton to Tullamarine pipeline, which are owned by the other four companies.

Mr. I. G. Hodges

A section of the Somerton to Tullamarine pipeline being prepared, to carry jet fuel to Melbourne's international and major domestic airport at Tullamarine.

The Somerton to Tullarmarine pipeline will transport jet fuel to Tullamarine (Melbourne's international and major domestic airport).

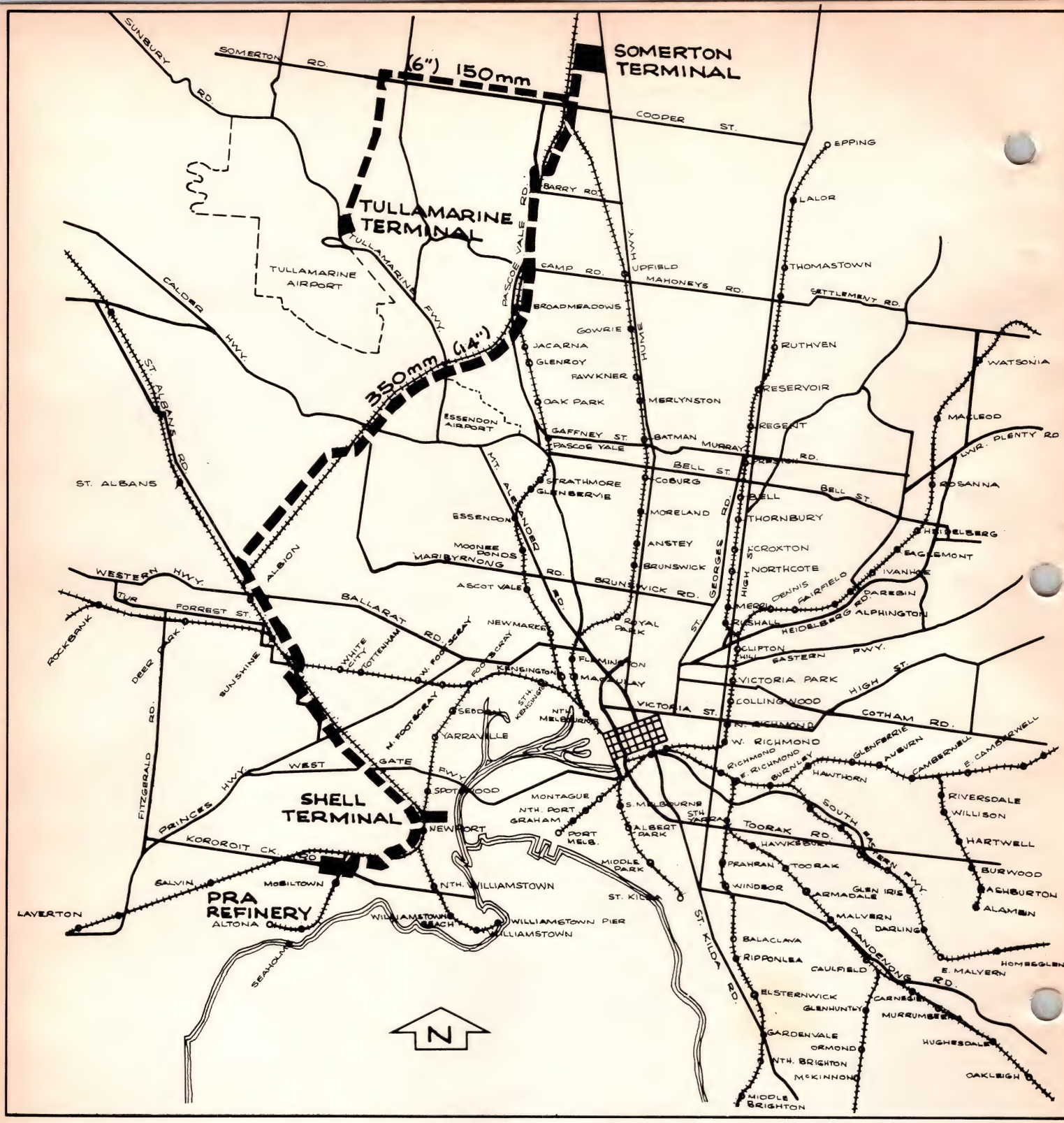
The construction of these pipelines promotes the objectives of the Victorian Government in lessening the impact of the oil industry on the environment.

The work has been planned in two phases. Phase I, to supply Tullamarine with jet fuel, has now been completed. Phase II is to supply a range of products to Somerton for further statewide (northern and central) distribution by rail and road.

Whilst Phase I is of great importance, it will not have the same impact on VicRail as Phase II which will generate more distribution of oil products by rail. No firm agreement has been reached as to when Phase II will commence, but VicRail is actively pursuing studies to ensure that it can be implemented as early as possible.

The project will reduce significantly the volume of oil-industry road traffic now engaged in distribution from in-city terminals and will further diminish the need to extend or lengthen the life of existing oil storage facilities in the areas of Spotswood and Newport. Both these objectives constitute substantial items of Government policy.

The Altona to Somerton system consists of thirty-four kilometres of 355.6 mm OD pipeline from the



PRA Refinery at Altona to the Somerton Terminal, with a connection for the Shell Newport Terminal.

The Somerton-Tullamarine system consists of 11 kilometres of 168.3 mm OD pipeline from Somerton to the Tullamarine Terminal.

At Somerton the facilities include an intermediate storage tank of 75,000 barrels, together with all necessary pumps, meters, control valves, fire systems, etc.

The overall system will be operated by a computer-based supervisory/control system with a master station located at Tullamarine, connected with Telecom Datel Service private lines to intelligent remote terminal units located at Altona, Newport, Somerton and Tullamarine.

The Altona to Somerton pipeline follows VicRail's right-of-way for most of the thirty-four kilometres. This was found to be the only practicable route available which would avoid adverse public reaction and environmental objection. The Somerton to Tullamarine pipeline is mainly situated on road reservations.

The joint venture's right to use VicRail's land is by way of a licence for the period of the Pipeline Permit issued to the joint venture under the Pipelines Act. The licence provides for a commercial licence fee to be paid to VicRail and the parties have agreed that this is to be determined by the Victorian Valuer-General.

The joint venture is based on a Participants' Agreement and an operating Agreement which set out the rights and liabilities of the joint venturers. Mobil Oil Australia Ltd has been nominated the initial operator of the system. An interesting term of the Participants' Agree-

(continued on page 30)

The Australian Railway Research and Development Organisation

On 17 November 1978, the Minister for Transport, the Honorable P. J. Nixon, M.P., officially opened the Australian Railway Research and Development Organisation building in Lonsdale Street, Melbourne. The date was some 19 months after the announcement by the Australian Transport Advisory Council of the proposed establishment of ARRDO — a body founded in response to a need to "improve the overall efficiency of railway systems and to reduce the impact of railway deficits on government budgets".

Australia's railways collectively make up one of the nation's biggest businesses. They are virtually all government-owned and, on an annual basis, they earn around $1,000 million, provide 300 million passenger journeys, and carry 100 million tonnes of freight. They employ over 100,000 people.

They also face some major problems. In recent years, the growing deficits shown in their financial statements have been a significant load on government budgets. While governments recognise the value of railways in Australia — factors such as long distances, heavy freight and energy conservation make rail eminently suited to Australia's transport needs — they also recognise the necessity of examining the current management and policies of the railway systems, to ensure that the future of rail does not continue to constitute such heavy demands on government funds.

ARRDO has been established to examine, and find solutions for, the problems which face Australian railway management today, specifically in the areas of the railways' relationships, with governments, rail users, and the community as a whole. For although systems might aim to become commercially viable organisations, they are also expected by governments to provide a community service which is not necessarily financially viable. ARRDO's aim is to provide policies which will, in the long term, mean that railways in Australia are more efficient and, as a result, justify the government expenditure required to fulfil their community service obligations.

In achieving this aim it is necessary that ARRDO be in a position to be objective about the railway organisations it is examining; but, at the same time, it must have the support of, and a close working relationship with, railway systems' people. This will ensure that ARRDO's output is relevant, practical, and acceptable to the systems.

Because of the necessity for ARRDO to be independent of any particular system, the Organisation is not a statutory authority, but has been incorporated as a private company in Victoria, and has its own officers in Melbourne. The railway systems throughout Australia — the Australian National Railways, the Queensland Government Railways, the Public Transport Commission of New South Wales, Westrail and VicRail — contribute half of ARRDO's operating costs (the Commonwealth Government providing the other half), and their Chief Executive Officers, together with the Secretary of the Department of Transport, comprise ARRDO's Board of Directors. Mr A. S. Reiher, Chief Commissioner of the PTC of N.S.W. is currently Chairman of ARRDO, and Mr A. G. Gibbs, A.O., Chairman of VicRail, is Deputy Chairman.

* * *

Even before it was fully established, the matter of a work programme for the Organisation was under discussion by the Board. At its first meeting, in August 1977, the Board appointed an Interim Programme Advisory Committee, with members from all systems and the Bureau of Transport Economics, to identify a preliminary work programme for ARRDO pending the appointment of an Executive Director.

In May 1978, Dr Paul Grimwood, formerly Director of Management Services, Westrail, took up the position of Executive Director of ARRDO. Over the next few months ARRDO's work programme was developed in detail, incorporating the earlier work of the Advisory Committee and input from rail systems.

It was soon apparent that ARRDO's work programme would have two major characteristics. One is a systematic approach to all aspects of rail activities, so that the projects it undertakes have a definite relationship one with another and can also be seen to contribute significantly to the longer-term goal of improved efficiency of the rail systems. The second is that the programme provide regular output which will be of direct use to systems, as well as contributing to rail betterment. ARRDO's activities are, accordingly, directed at problems which apply to railways in Australia as a whole. The problems of any one system will only be investigated where the situation is common to all systems.

During the early stages of the identification of the work programme a core team of research officers was recruited to assist the Executive Director both in formulating and carrying out the programme. Each member of this team has an academic and practical background highly relevant to ARRDO's areas of work — in railway economics, operations research, corporate planning, marketing policy analysis, forecasting. Between them, these research officers are currently leading the nine projects specified and approved by the Board for this financial year.

These include projects on demand forecasting, corporate planning, financial planning and control, investment analysis, consideration of public service obligations and organisational development. ARRDO now reports that four of the project reports* were completed by the end of June 1979, with interim reports prepared for the remaining projects. Further individual reports will be produced over the next two years, culminating in a major report in 1981. The 1981 report will constitute the "Case for Rail" in Australia.

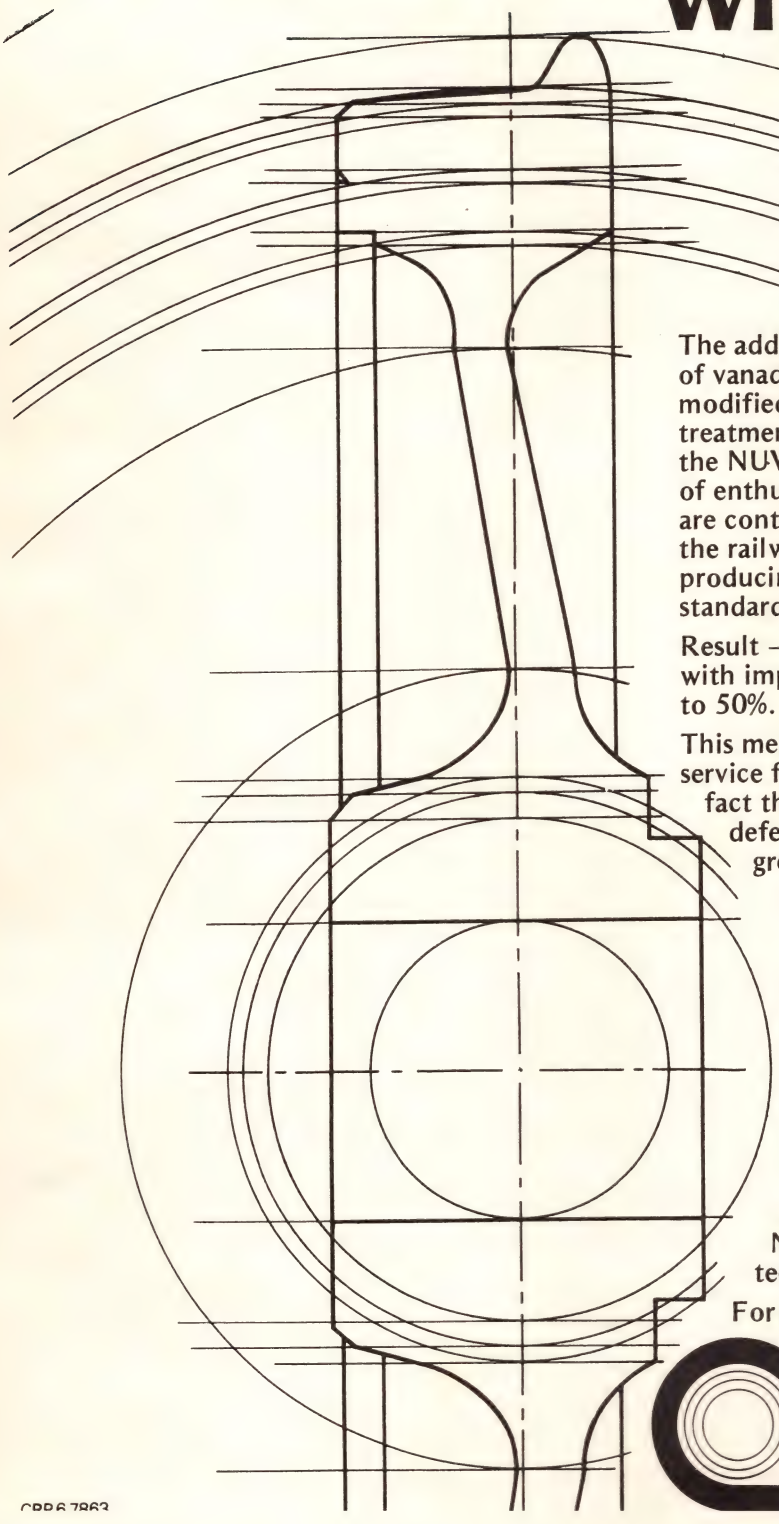
ARRDO's work programme has been provisionally outlined up to the 1981 report, but will be reviewed annually. This review will be undertaken by the ARRDO Board, assisted by a Programme Advisory Committee which comprises individuals with both direct and indirect association with rail systems.

Recruitment of research staff is continuing, and will continue for some time. Eventually, ARRDO will have three research divisions:

*The completed projects are: Survey of Deficit Contributors; Pricing Practice; Definitions of Public Service Obligations; Costing Practice.

(continued on page 28)

the "NUVAN" wrought steel wheel



The addition of vanadium and modified heat treatment is only part of the NUVAN story. Our team of enthusiastic technologists are continually striving to improve the railway wheel while consistantly producing to our high quality control standards — that's their challenge.

Result — The NUVAN wrought wheel with improved fracture toughness of up to 50%.

This means that the risk of catastrophic service failure is reduced considerably. In fact the critical size of service induced defects is almost doubled. Therefore a greater opportunity is available to detect by normal non-destructive testing methods such defects before critical sizes develop.

Deeper hardness profiles also exist in the flange, flange throat and the back face of the rim, for better wheel wear performance.

All of this plus full compliance with standard railway specifications.

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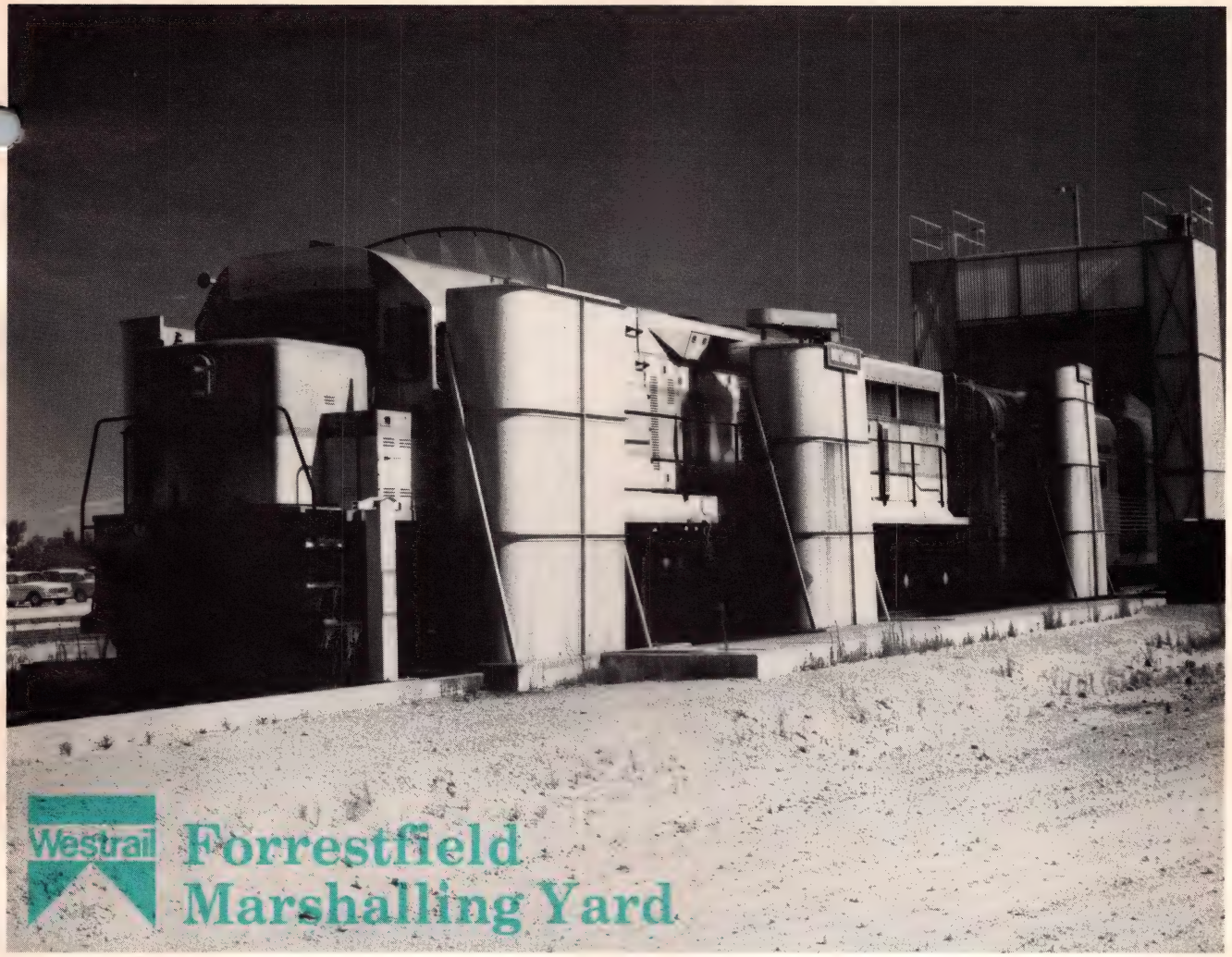


Westrail Forrestfield Marshalling Yard

Westrail's Forrestfield Marshalling Yard, which incorporates nine standard- and seven narrow-gauge arrival roads and eight standard- and 32 narrow-gauge classification sidings, was hailed as one of the most modern installations of its kind when it was officially opened six years ago.

Today it remains at the heart of Westrail's operations, centralising and extending the marshalling of loading for country destinations previously handled at four other metropolitan yards.

Forrestfield, which is the major yard for both narrow- and standard-gauge marshalling and wagon distribution, is divided down the centre, with standard-gauge activities on the eastern flank and narrow-gauge on the western flank; the service facilities down the backbone of the yard are shared by both rail gauges.

The major building in the complex is the three-storey office accommodating the Yard Manager and other operational staff. The third floor is shared by the Yard Master and Area Signalman and houses sophisticated signalling equipment. It is the signal control centre for the entire Forrestfield Marshalling Yard complex.

The Hump

The narrow-gauge section of Forrestfield is equipped with a fully-automatic hump, the second of its kind built in Australia. It works on a bi-directional basis to obtain the maximum use from the 32 classification sidings, and has enabled Westrail to deliver goods faster and in better condition than by earlier modes of marshalling.

The method of operation is simple as well as swift.

As a shunting train from Kewdale Freight Terminal enters one of seven narrow-gauge arrival sidings, the destination of each wagon is conveyed by two-way radio to the hump control tower.

This information is recorded by the teleprinter operator, who then refers it to the foreman. He decides on the segregation of the wagons and prepares a "cut" list.

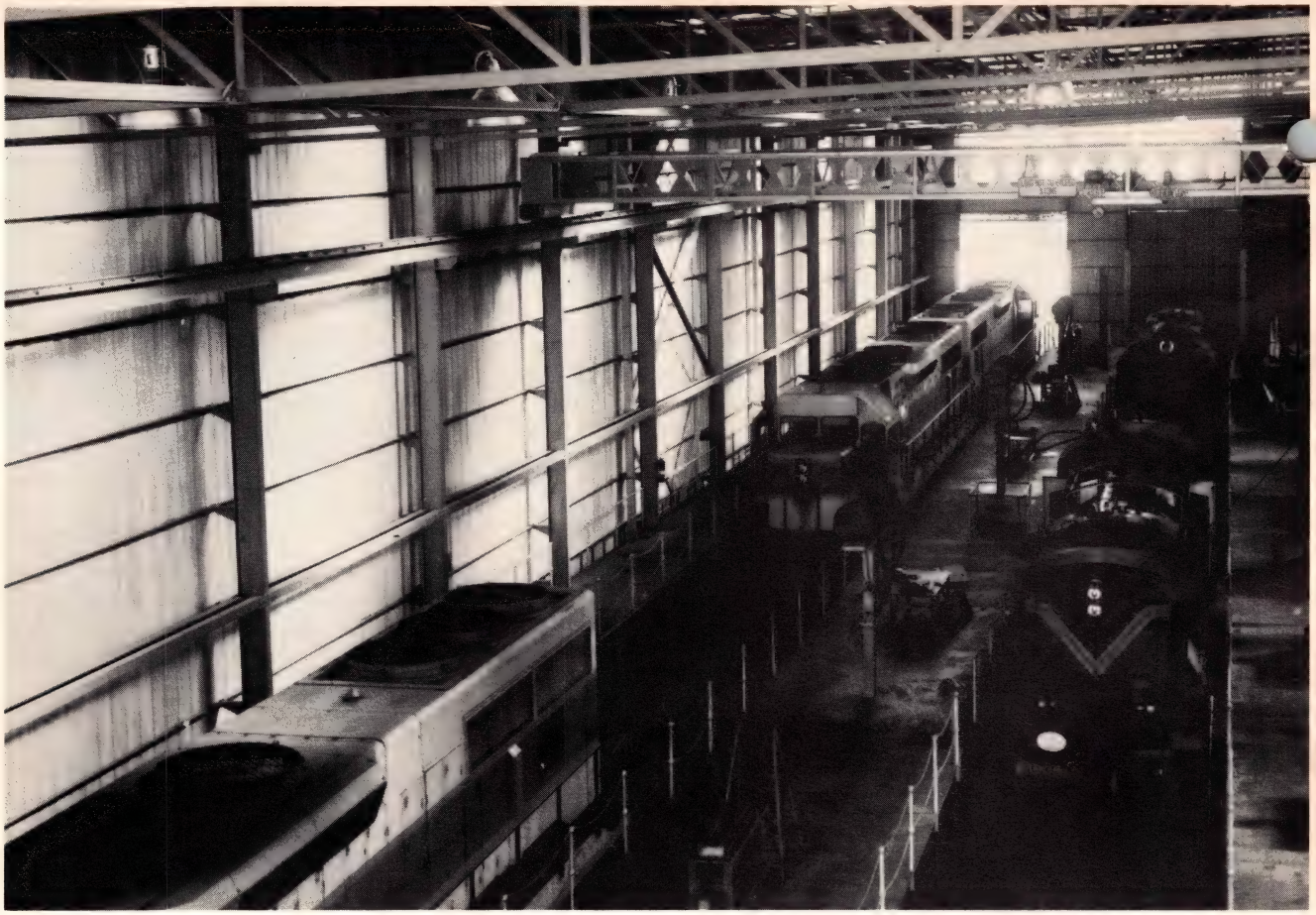
The teleprinter operator then prepares a paper tape and a printed list of wagon details. The paper tape, on which siding destinations have already been coded, is fed to a route progression system.

"Indian Pacific" being cleaned in the Forrestfield carriage-washing plant.

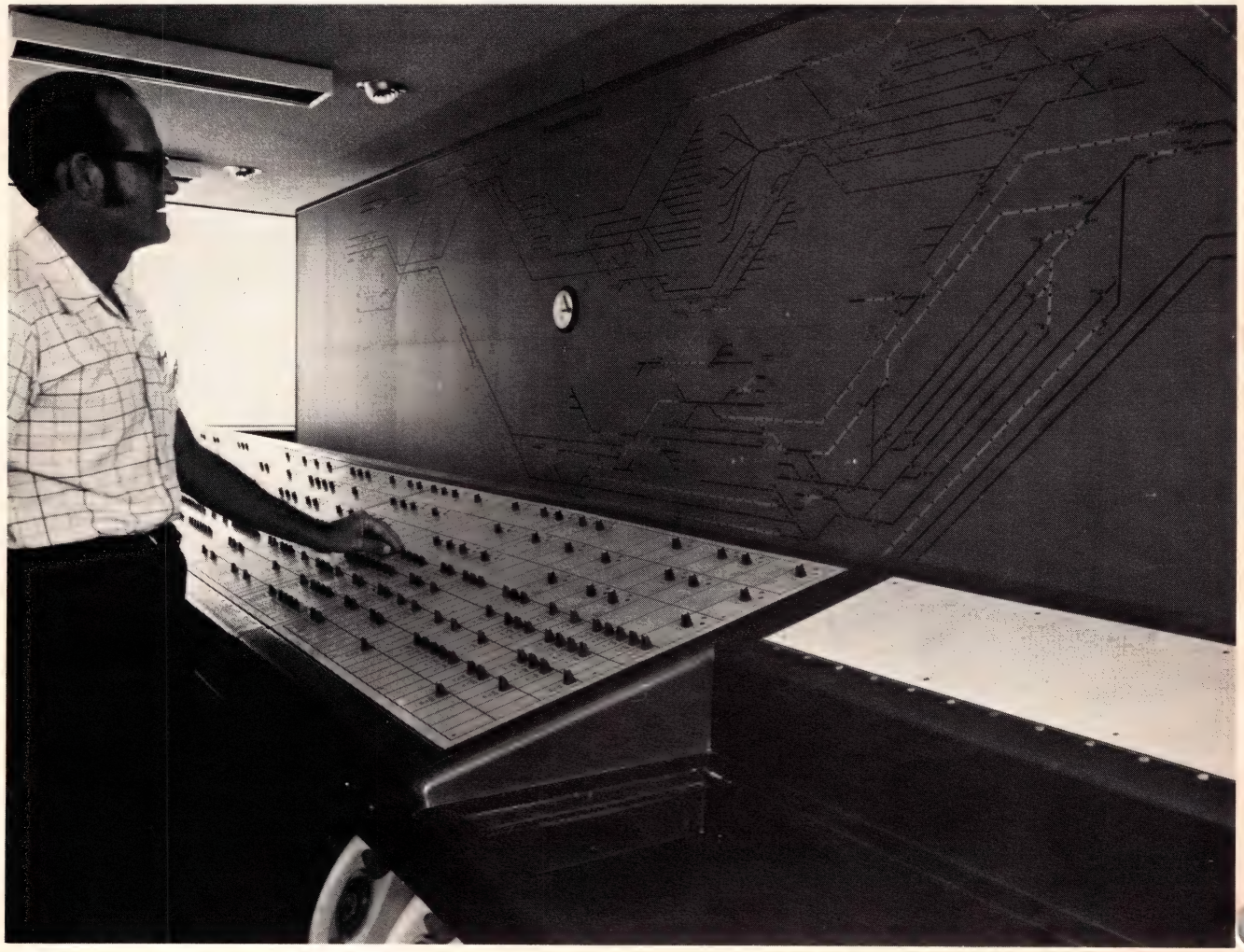
This system permits automatic or manual operation of the hump yard by a controller who selects the appropriate positions of control switches on the console of the automatic route-setting equipment.

Two "M" class diesel hydraulic locomotives, equipped with specially calibrated speedometers, are used to propel wagons from the arrival sidings at a speed of about 2 kmh over the hump to one of 32 classification sidings. The system, which is fully automatic, handles up to 150 wagons an hour and since its introduction in 1973 has "humped" over three million wagons.

The hump itself is about 4.14 metres above the classification sidings allowing the wagons to be accelerated to a speed of 3.05 m/sec. Wagon speed is controlled by a series of pneumatic self-contained retarders on the track which slow the wheels of the wagons to a critical speed setting, below which wagons pass unhindered.



Locomotive maintenance at the Forrestfield depot.



The Area Signalman checks the constant movement in the yard

Controlling the hump yard from the tower overlooking the Forrestfield classification sidings.

Transferring timber from narrow-gauge to standard-gauge at the Forrestfield gantry.

Meals for interstate passengers are prepared at the Forrestfield kitchens.

Other major facilities within the Forrestfield complex include:

Carriage Shed

Here the complete re-victualling, cleaning and maintenance of interstate passenger trains and railcars to Kalgoorlie is handled. It is equipped with modern kitchen facilities where meals are prepared for eastbound departures of both "Indian Pacific" and "Trans Australian" as well as for "Prospector" passengers to Kalgoorlie.

Wagon Repair Depot

This comprehensive repair area services both the standard- and narrow-gauge wagon fleet and has made possible the closure of some older metropolitan depots. It also services wagons of other Australian rail systems that require attention while in Western Australia.

Transfer Area

A 25-tonne gantry crane is the major equipment required for transferring consignments from one gauge to another. It is particularly useful for transferring machinery arriving from the Eastern States for narrow-gauge destinations such as the Great Southern region, or conversely for transferring timber from the South West narrow-gauge network for interstate delivery on standard gauge.

Locomotive Depot

This replaced East Perth as the major metropolitan depot, providing scheduled maintenance and some heavy repair facilities for up to 230 narrow- and standard-gauge diesel locomotives. The depot extends over 9,300 sq m and is recognised by other railway systems as one of the most modern and compact installations of its type in Australia.

Civil Engineering and Stores Compound

In the southern section of Forrestfield Marshalling Yard there is also a Stores Branch depot and maintenance area for radio, signalling, telecommunications, structures and trackwork.

* * *

The Forrestfield complex, together with the Kewdale Freight Terminal, will remain as the hub of Westrail's metropolitan operations, forming one of the most up-to-date integrated railway establishments in Australia, strategically sited close to Perth to service both standard- and narrow-gauge rail traffic with maximum efficiency.

We have to thank the camel for some of the most important ideas in the development of the new Moroccan phosphate hopper wagons.

The extraction and transport of phosphates under the sweltering Moroccan sun place the severest demands on men and material. When, therefore, the Moroccan State Railways submitted an order for the development of new, self-discharging hopper cars of light metal design, the Alusuisse engineers, in collaboration with Ateliers de Construction Mécaniques de Vevey SA, endeavoured to utilise some of the basic features possessed by the classical means of desert transport.
An undemanding character for instance: aluminium forms an exceptionally hard layer of oxide, which requires no further surface treatment. Or loading capacity: the new wagons carry an effective load of 65 tons with a dead weight of only 15 tons. Or durability: aluminium is resistant to corrosion even under the most extreme environmental conditions.
Following the successful completion of tests on material and rolling characteristics, the 300 or so hopper cars will most likely soon be performing their exacting duty in the Moroccan desert. The economic progress of Morocco is the best acknowledgement of their work for the Alusuisse engineers.

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ALUSUISSE

The J. S. Dowson Memorial Prize, founded for junior Westrail personnel by the widow of Mr J. S. Dowson, a senior executive of Midland Railway Company and Westrail after amalgamation in 1964, was awarded this year to Colin Smith, a junior Traffic Officer at present working with the Marketing Branch.

Colin was selected by the trustees, Mr R. B. Martin, Comptroller of Accounts & Audit and Mr R. A. Thorpe, Assistant Secretary (Personnel), for his efficiency, conduct and participation in community affairs.

Commissioner of Railways, Mr W. I. McCullough said that he was pleased to see his record in the three years he had been with Westrail and the level of study he had attained towards a diploma in accounting.

The Commissioner added that he would like to see Colin Smith's achievement emulated by other young officers to fit them for promotions within Westrail in the future.

The previous Dowson award winners attended the informal ceremony at Westrail Centre, where Mrs Dowson presented the award.

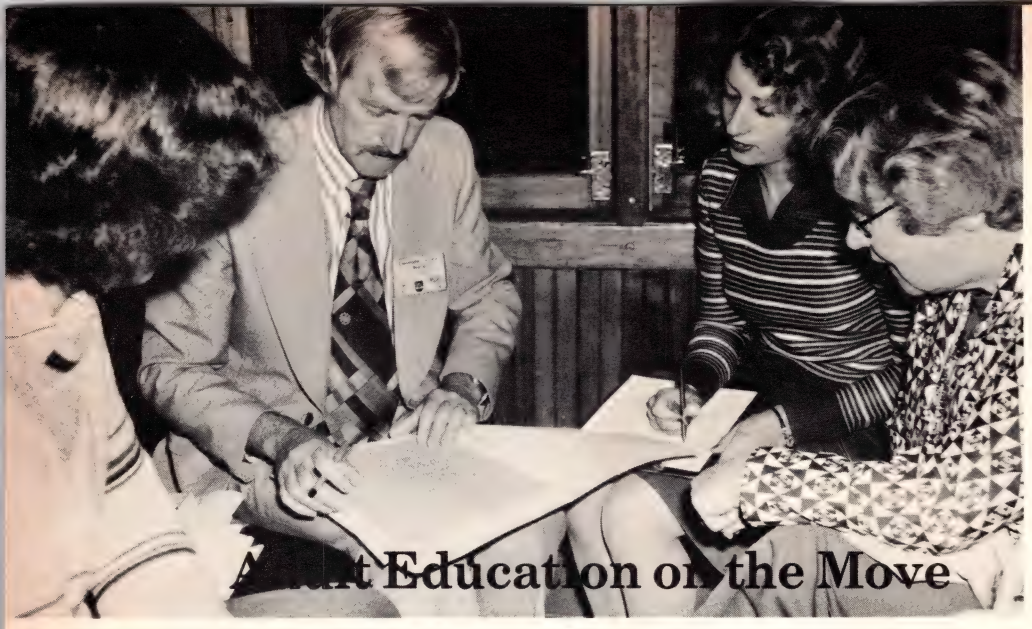
A stylish uniform has been designed for the new-look enquiry and information service on the ground floor of Westrail Centre, in keeping with Westrail's corporate image of a smart and efficient organisation.

The uniform is a three-piece gaberdine suit — the skirt and waistcoat in dark brown, the jacket pale apricot — with a beige blouse.

Pictured before one of the giants of a former era are the four Westrail telephone operators who have been selected to staff the positions: from left — Vera Hunt, Lyn Jones (supervisor), Lyn de Young and Ronnie Ryan.

Following widespread support of a ban on smoking in Perth's suburban rail and road transport, half of the seats in each of Westrail's "Prospector" Perth-Kalgoorlie railcars are now reserved for non-smokers.

Passengers are urged to make their preference known when making reservations.



Adult Education on the Move

Classes on Trains for Victorian Commuters

At 6.50 a.m., on the morning of 28 November 1978, thirty of the commuters who travel daily by train from Geelong to Melbourne, did so with a difference. During the 1¼ hour trip they studied Car Maintenance, Computers, History, or Essay Writing under the guidance of qualified tutors, or they chatted with an advisor about courses and careers open to them.

This was the first Australian attempt to conduct learning and leisure activities for train commuters. The project was initiated by the Victorian Council of Adult Education and Gordon Technical College, with the co-operation of the Victorian Railways and Deakin University.

The programme had been offered in response to an overwhelming demand: at the end of October, the Council of Adult Education and Gordon Technical College had surveyed 645 commuters on the three peak morning trains, and 516 passengers had expressed a strong interest in attending learning activities on the train. Sixty-two commuters also offered their services as tutors or group leaders.

Arts and crafts, credit courses, languages and hobbies proved to be the most popular choices. In particular, Car Maintenance, Computer Studies, History, English, Gardening, Music, Photography, German and Italian attracted many commuters, one of whom wrote on his questionnaire: "I have travelled by train for 9½ years and this is a positive move to creatively use the 3 hour a day travel time."

The Victorian experiment was inspired by two successful overseas attempts to provide learning experiences for long-distance commuters. The British "Brain Train" commenced operation on the Cambridge to London line early in 1977, offering courses such as Antiques, Philosophy, German, French, Computer Science, Bridge, Natural History and Economics. The scheme has been highly successful and has spread to several other lines.

Since 1971 commuters in the New York City area have been studying for degrees in Adelphi University's "Classroom on Wheels". The scheme was originally aimed at businessmen studying business courses, but has widened to incorporate other subject areas and commuter lines. The first graduate on the New York train has written of his experiences:

"Whatever the disadvantages they were outweighed by the advantages. After 20 years away from school, I probably would never have returned for my degree. I had five kids, a wife, a time-consuming job. But I was ambitious and wanted to get ahead. The program was the best way to do it and still spend time with my family. It was three commuting hours each day put to good use."

The Council of Adult Education has identified four major factors behind the success of their commuter study experiment. Firstly, the information gained from the survey meant that the courses were selected in accordance with real needs and interests. It also helped the organisers in deciding maximum group sizes and appropriate teaching strategies.

The support of Victorian Railways was another major factor. V.R. personnel provided accurate information on passenger numbers, supplied officers to assist during the survey and the four-week class programme, and were generally unfailing in their moral support. Railways Marketing Officer, Arthur Edbrooke, was one of the stalwarts of the project, with valuable assistance from David McTaggart – Geelong District Superintendent, Noel Fry — Geelong Station Master, and Adrian Westwood of Passenger Services.

Support and encouragement was also given by V.R. Manager, Mr Ian Hodges, and the Victorian Minister for Transport, Mr R. G. Maclellan. The Minister provided funding for the scheme and inspired the organisers in their planning. The Council of Adult Education also had the support of their own Education Minister, Mr L. H. Thompson.

The third reason for the success of the project was the suitability of the Geelong to Melbourne service. The overseas schemes had demonstrated that journeys of 1¼ hours or more, running express for much of the trip, are necessary to provide an uninterrupted length of time suitable for a class.

Fourthly, there was adequate publicity and promotion of the scheme. Geelong and Melbourne radio stations and newspapers gave generous, free coverage, and Victorian Railways co-operated in the distribution of information brochures on the peak morning trains.

Currently the Council of Adult Education is liaising with Victorian Railways on a costing for modifications to a carriage, to give larger classroom space, carpeting, improved lighting, tables, and acoustic spray on the ceilings. The Ministers for Transport and Education are examining the Council's report and submission on the project. If the requested funds are made available the organisers plan to offer a series of learning activities on the Geelong line and to survey five other lines which may be suitable.

Victoria has proved that learning on trains represents a major step towards improving the quality of rail service offered to commuters, not in the normal sense of improvement in frequency, speed or accommodation, but in the sense of maximising the use of the commuters' time. Inquiries about the project can be sent to Christine Cookson, Council of Adult Education, 256 Flinders Street, Melbourne, Victoria 3000, or telephone (03) 63 4231.

(Illustration by courtesy of Herald & Weekly Times, Melb.)

C.A.E.'s Arts Train

Victoria's Council of Adult Education is preparing the Arts Train for its thirteenth country tour. Initiated in 1971 to take Arts and Craft facilities to some of Victoria's smaller country towns, the train consists of four carriages, old country rolling stock used in the past by the Wool Board, which the Council hires from the Victorian Railways.

The carriages are fitted out as a pottery workshop (complete with three pottery wheels and two kilns), a jewellery workshop, a workshop for painting, leatherwork or fibre crafts, and a display area or lounge. They are the venue for lessons, and the tutors link up with the train in each town where they are teaching.

Local halls are used for workshops off the train.

There are two tours, of two to three months' duration, each year. School groups visit the train in the mornings (50c per child) and classes for adults are held in the afternoons and evenings. The train operates twelve hours per day, and each carriage takes 10-12 people per session.

The train is fully equipped with all materials, tools, mechanical equipment, paints, brushes, paper and other necessities. As work completed by students becomes their own property, a small "materials" charge is levied. No previous experience is necessary.

Apart from the practical classes held on the train, local groups have used it for meetings and social evenings; and many special activities and demonstrations have been arranged. These included a three-day visit to Beechworth Training Prison in 1978, during which full-time workshops were organised for the prisoners.

Other community activities have included: 2-day workshops in fibre crafts, and in painted dolls and puppets; talks on indoor gardening; photography workshops; street theatre (by the Magic Mushroom Mime Group); a craft fair at Tallangatta; exhibitions by the National Book Council and the Craft Council of Australia; a display of video tapes, slide-kits, multi-media kits and books; and an exhibition of ethnic embroidery and decorative needle-craft by the Ukranian Women's Group.

The Arts Train has been made possible by the assistance of the State Government, and the excellent maintenance services provided by Victorian Railways.

Its thirteenth tour will cover North-West Victoria and the Mallee during September, October and November 1979. There will be adult workshops at Sea Lake (8-13 September), Wycheproof (15-20 September), Charlton (22-25 September), Inglewood (27 September - 1 October), Elmhurst (3-7 October), Rupanyup (10-15 October), Goroke (18-23 October), Natimuk (25-30 October), Patchewollock (3-8 November). Hopetoun (10-15 November), Beulah (17-22 November), Warracknabeal (24-29 November) and Murtoa (30 November - 4 December).

A drama programme for children will also be presented at each centre, in co-operation with the Victorian Youth Theatre Association, as an International Year of the Child event.

The subjects for adults, with professional crafts tutors, will be Stained Glass ($3 fee), Pottery ($2) and Painting ($2).

(Illustrations by courtesy of Herald & Weekly Times, Melb.)

LOTOX* cable passes the acid test

Without LOTOX* cable sheathing, corrosive hydrochloric acid is released into the air in the event of fire.

With LOTOX* cable sheathing, the amount of corrosive acid released during a fire is significantly reduced.

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Pirelli engineers studied the problems and came up with LOTOX*, a cable sheathing and insulation compound with all the mechanical and electrical properties of conventional PVC, but which is non-flame-propagating and produces a significantly reduced amount of HCl gas during combustion.

LOTOX* cable covers the complete range of conventional building wires and is particularly suitable for use in substations, telephone exchange and computer buildings, where it will minimise the extensive and costly damage caused by fumes from localised fires.

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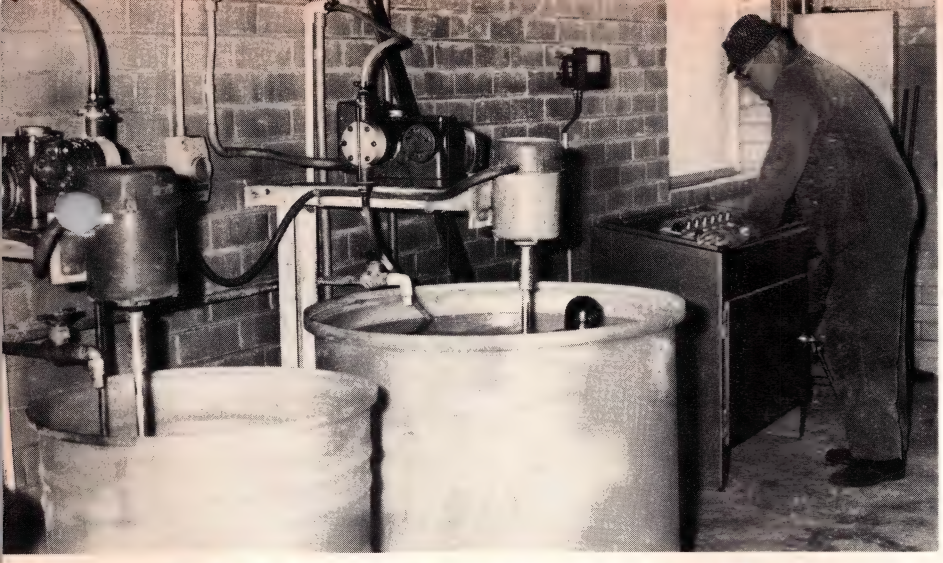

Control Room,
Pollution Control Installation, Mayne

Pollution Control Clarification Plants

Since 1970, the Queensland Railway Department has been actively engaged in controlling effluent disposal from its workshops and diesel servicing depots. The majority of depots have a primary treatment plant (gravity-type oil Interceptor/Separator), and although a significant increase in effluent quality has been achieved, a further treatment is required.

Accordingly, a prototype waste clarification plant was commissioned at Mayne in 1977, which complemented the primary plant and now produces an effluent acceptable to the Water Quality Council of Queensland for discharge to natural waters. The plant has been designed for "continuous" operation and handles approximately 14,500 litres per hour (4 litres per second). An 18,000 litre "batch" treatment clarification plant has been installed at the Willowburn Depot, and the method and sequence of treatment procedures has been based on design criteria adopted for the Mayne clarification plant. It is envisaged that "continuous" plants will be installed at depots where daily output is in the vicinity of 40,000 litres per day, and "batch" treatment plants for smaller depots where daily output is approximately 10,000 litres per day.

Typically, the influent to the clarification stage of treatment at the Mayne plant has a pH between 6.5 and 7.0 and contains contaminants up to the following levels:

Emulsified oils	150 mg/litre (ppm)
Suspended solids	200 mg/litre (ppm)
Chromium	10 mg/litre (ppm)

Free oily matter (oil/degreaser/distillate) is removed in the oil interceptor and subsequent 90,000 litre effluent holding tank; the contaminants of principal interest for treatment are emulsified oils and chromate (from spilt chromated diesel coolant).

The plant operates as follows:

(i) Ferrous sulphate is added to the waste water to reduce any hexavalent chromium (i.e. chromate) to the trivalent state. Hexavalent chromium cannot be removed as an hydroxide. However, it can be reduced by ferrous sulphate to trivalent chromium which is removable as a hydroxide by simple pH adjustment. In reducing the chromate, the ferrous sulphate is itself oxidised to ferric sulphate. Alternately, any sulphide which might be present is precipitated as ferrous sulphide.

(ii) The waste is then made slightly alkaline (about pH8) and air-agitated for at least fifteen minutes. The deficiency in dissolved oxygen content is thus corrected, and at this pH, ferrous, ferric, and chromic hydroxides are precipitated, the slightly soluble ferrous hydroxide being rapidly oxidised (by the dissolved oxygen) to the quite insoluble ferric hydroxide. Given the agitation provided by the air, this ferric hydroxide "floc" clarifies the water by adsorbing emulsified oil and suspended solids.

(iii) To facilitate removal of this floc from the clarified water, small quantities of a suitable polyelectrolyte (a long chain organic molecule which acts as an electrolyte) are added to provide a "bridging" effect between particles of floc, which thus build to flocs of sufficient size and density that they settle rapidly. The initial rapid mixing which is necessary for good dispersion of the polyelectrolyte is followed by a more gentle agitation to promote floc-building, after which the floc is allowed to settle, leaving a clarified supernatant.

(iv) At the discharge end of the clarification tank, in the flocculation compartment, the waste enters into a series of parallel plates (a "lamella" separator pack). As the waste flows downward between each pair of plates, floc settles towards the lower plate, and at the bottom of the pack, the floc drops away into a sludge zone while the clear supernatant is intercepted and diverted into a channel which feeds into the outlet compartment at the top of the pack, finally discharging to stormwater.

The quality of effluent, treated at a throughput of 4 litres per second, is typically as follows:

pH	7.5-8.0
Oil and Grease	<5 mg/litre
Suspended Solids	<2 mg/litre
$B.D.D._{.5}$	10 mg/litre
Dissolved Oxygen	>3 mg/litre
M.B.A.S.	<4 mg/litre
Total Chromium	<0.3 mg/litre
Total Iron	<0.5 mg/litre

Pollution Control Installation, Diesel Shed, Mayne

Tenders and Contracts

Tenders invited include:

PTC — Provision of public address systems at Flemington and Strathfield railway stations (Specification 474): closing 22 August.

QR — Design, construction, supply and delivery of five first-class roomette sleeping cars and five economy class sitting cars: closing 29 October.

Recent Contracts include:

QR — Construction of railway formation, roadworks and overpass bridges, Erakala to Mackay Harbour branch railway: John Holland (Constructions) Pty Ltd ($4,227,169).

QR — Track construction — Gregory branch line, Gregory railway project: Roberts Construction (Pacific) Pty Ltd ($2,077,029).

QR — Construction and delivery of fifty aluminium bulk grain hopper wagons, Class QGX: Vickers Ruwolt, Scotts of Ipswich Division ($1,262,550).

QR — Construction of railway formation for Callemondah marshalling yards, Clinton Coal Facility spur line and power station loop extension, Gregory railway project: G. J. & J. E. Ferguson & Co. Pty Ltd ($1,114,291).

QR — Manufacture, supply and delivery of one hundred cast steel bogies for QGX wagons: Bradford Kendall Foundries Pty Ltd ($468,300).

QR — Supply and delivery of forty diesel alternator sets and auxiliary equipment: Distragen Pty Ltd ($290,668).

QR — Maintenance of track machines issued to Nos 1 and 3 Sleeper Renewal Gangs, Northern Division and South-Western Division: (a) Fessl Pty Ltd ($197,600) (b) B.M.W. Nominees Pty Ltd ($213,200).

QR — Manufacture, supply and delivery of twenty-eight two-berth industrial caravans: Duravan Pty Ltd ($182,158).

QR — Supply and delivery of train lighting element assemblies and accessories: Dunlop Batteries ($162,300).

QR — Manufacture, supply and delivery of 5,000 prestressed concrete sleepers: Concrete Industries (Monier) Ltd, Pipe & Contracting Division: ($131,640).

VR — Design, supply, delivery and installation of automatic sprinkler system, Mount Buffalo Chalet: Wormald International (Aust.) Pty Ltd ($230,146).

VR — Carriage of passengers and parcels between Bendigo and Deniliquin: Kangaroo Flat Bus Lines Pty Ltd ($167,994).

VR — Transportation of containers to and from rail container terminals: R. Hoffman & Co. Pty Ltd ($147,808).

VR — Manufacture, supply and delivery of equipment cabinets and apparatus: L. M. Ericsson Pty Ltd ($144,721).

VR — Supply and delivery of cast steel bogie parts: Bradford Kendall Foundries Pty Ltd ($122,580).

WAGR — Supply and delivery of sixty wagon bogies: Bradford Kendall Foundries Pty Ltd ($169,120).

WAGR — Supply and delivery of 145,000 tonnes of crushed metal ballast: Readymix Group (WA) ($671,720).

(continued from page 17)

Corporate Planning, Research and Development, and Management Services, with each divisional manager reporting directly to the Deputy Executive Director. Meanwhile, so that the work programme can get under way and results be seen in as short a time as possible, ARRDO has engaged consultants to provide specialist support for each of its current projects. There is also close liaison with rail systems' people to ensure that all relevant factors, whether they be economic, technical, related to the workforce or to social or political aspects, are taken into account.

A remark by Mr Nixon in his speech of November 17 seems appropriate: "ARRDO's establishment comes at a very critical time, for the future of rail transport in Australia might eventually hinge on how well it performs its appointed task."

New Railway Vehicle for Overhead Maintenance Work

rmanent Way Equipment Co. Ltd, Nottingham have developed a railway vehicle which enables overhead work to be carried out on bridges, tunnels and electrification equipment more quickly and safely, with less manpower and with less disruption to traffic. Its use will, in many instances, replace scaffolding, avoid the use of "works trains", and eliminate ladder work.

The Permaquip Railway Overhead Vehicle is basically a powered rail trolley, fitted with a platform, which by scissor action, actuated by hydraulic rams, can be raised to a maximum height of 5.65 m (18′ 6″). The platform has a push-button controlled cantilever extension giving a further 1.65 m (5′ 6″) reach. This enables work to be carried out over a wide span and leaves the adjacent track open. The maximum load, 400 kg, is ample for two workmen and their equipment. Lamps are incorporated for working in tunnels and at night.

To enable the vehicle to be moved quickly on to and off the track, or to an adjacent track, it incorporates a hydraulically-powered lifting turntable so that it may be lifted, turned and positioned on cross tracking bars for removal. It takes only four minutes to position it on the track and three minutes to off-track it. Track-side stillage is another standard feature to ensure that muddy and shaley banks present no hazard.

The vehicle can travel at speeds up to 15 km/h (Mk 1) or 28 km/h (Mk 2), towing trolleys of equipment up to a gross weight of 1000 kg (1 ton). With the platform extended the vehicle is limited to pre-set speeds up to 5 km/h.

Safety for the operators has been an important consideration in the design. It features safety interlocks between the rail hooks and the cantilever extension, and between the turntable and the scissor extension. The platform-mounted push-button and foot-operated controls have back-up emergency controls for lowering and off-tracking the unit; these are fitted to the base. Safety rails and tow boards are fitted to the main platform and cantilever extension.

The Australian distributor is Granite Conquip Machinery, Lidcombe, N.S.W.

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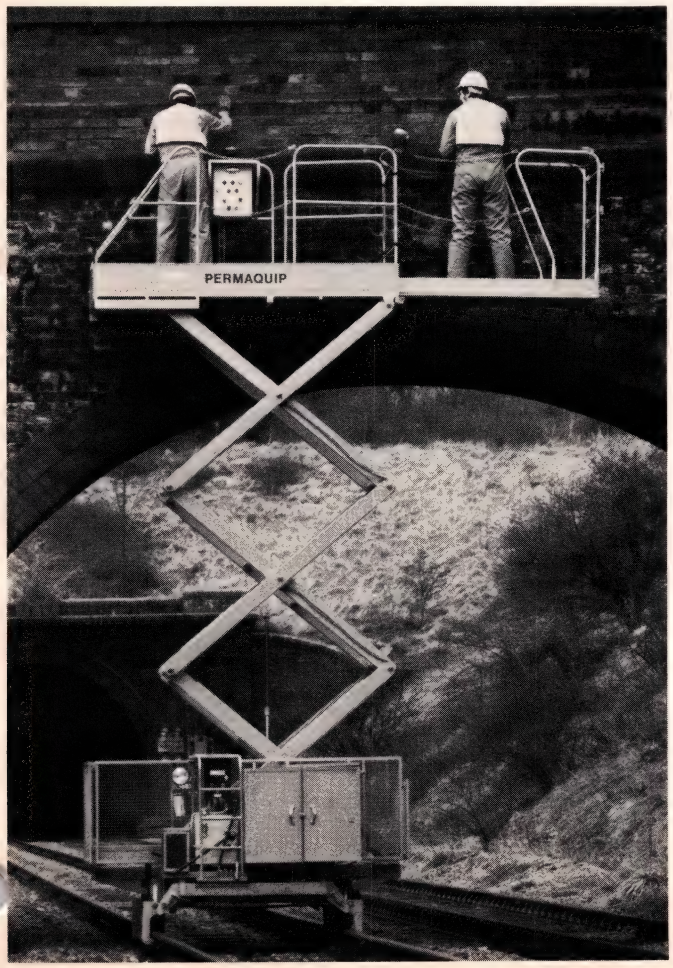
A **"Steam Safari"** — 4,000 km behind 14 different classes of steam locomotives — has been organised by South African Railways, and the South African Tourist Corporation, 115 Pitt Street, Sydney has the details.

The tour begins and ends in Johannesburg, the route being by way of Bloemfontein to Aliwel North, to Graaf Reinet and Oudtshoorn, to George, Knysna and Mossel Bay, then on to Worcester and Cape Town (where there is a leisure day, followed by a full-day motor excursion to Cape Point). The return journey is through Beaufort West, De Aar, Kimberley and Klerksdorp.

South Africa — Last Stronghold of Steam, a particularly attractive and well-produced booklet, which illustrates and describes 25 classes of SAR steam locomotives, and details seven other tours for steam enthusiasts, ranging from seventeen to twenty-eight days, is also available.



Fear no ill — it's Quick Rail

By LAWRENCE MONEY, Herald Transport Reporter

Battered by weekend vandalism and hounded by cancellations and disruptions this morning, VicRail might have looked like a loser to most of its patrons today.

But to passengers aboard a blue Harris train from Box Hill, the Railways came through with flying colors.

Their train had entered the Jolimont yards and slowed down for the traditional "sit and wait" when a young woman fell ill.

Fellow passengers found a seat for her.

By this time the train was caught in a snarl caused by overhead wire problems and looked set for a long wait.

A Burwood man opened the door and asked a railways maintenance man to try to phone the signal room and have the train speeded through.

Trackside phones are not directly connected to the control room, but the railway worker managed to get the message through.

Within two minutes the train was moving into platform two.

Staff there had been alerted and were looking out for the woman, who by this time had recovered.

A passenger who phoned The Herald, said:

"The Railways get so much criticism, I thought they should be congratulated on this one."

(by courtesy of Herald & Weekly Times, Melb.)

Railway Preservation in Western Australia

In August 1969, the establishment of what has come to be regarded as the finest railway museum in Australia began. A site was generously donated by a long-established business enterprise at Bassendean, a few miles from Perth.

The West Australian Division of the Australian Railway Historical Society developed the site with assistance from Westrail and from railway enthusiasts on a voluntary basis, and is continually improving and adding to its collection of memorabilia.

This museum is not just a locomotive museum, but a comprehensive display of all facets of the railway industry. The Western Australian Government Railways, timber railways, gold-mining railways, iron ore and other private railways, including the former Midland Railway Company of W.A., are all represented.

Steam locomotives form the majority of the outdoor exhibits, but visitors to the museum can view hundreds of other items of railway equipment including a fully-equipped signal cabin, a "Kalamazoo" type fettlers trolley, a water column, one of Perth's long-vanished tram cars and several old railway carriages.

None of the rollingstock used on the first Government railway line between Geraldton and Northampton survives from 1879. However, there is "Katie", a steam locomotive built in 1880 and originally used to haul trains between Fremantle and Guildford.

In the recently-opened Exhibition Building at the museum there is a display of historical photographs, maps, diagrams and other railway artifacts.

All site development and restoration at the museum has been carried out by Society members on a voluntary basis.

(continued from page 16)

ment is that VicRail's Pipelines Pty Ltd has a 25% throughput right.

The overall cost of the system is in the vicinity of $16 million, the Altona to Somerton pipelines' share of this cost being just over $11 million.

While the capital of VicRail Pipeline is somewhat nominal, the financing of the companies' share in this major project has been by way of loans from VicRail based on a Mortgage Debenture arrangement.

Now, with the commissioning of Phase I, VicRail should see benefits from the pipeline by way of

- Licence Fee,
- Interest on its investment in VicRail Pipelines Pty Ltd,
- Dividend on its share in VicRail Pipelines Pty Ltd,

and, of course, with the introduction of Phase II, VicRail can expect substantial additional haulage of oil freight.

In addition to these direct benefits, through VicRail Pipelines Pty Ltd, VicRail is gaining an indirect 'spin off' in being involved in a major commercial enterprise and gaining an understanding of the economics of pipelining and its impact on rail. Such benefit must be of great value in the future.

(continued from page 13)

rates. An automatic destination indicator operable from the drivers cab will be fitted to the front of each motor car.

* * *

With the delivery of the new order, VicRail will operate three separate fleets of trains — 56 blue trains designed in 1955, 59 silver trains designed in 1969, and 50 new silver trains designed in 1978.

The new trains in particular will reflect VicRail's determination to provide the level of service and comfort that the travelling public expect. This service will be highlighted when the new trains begin operation on the first stage of Melbourne's new underground loop, due to be opened between late this year and early 1980.

(continued from page 31)

flashover, and the profile has been streamlined and strengthened to reduce the chance of accidental breakage. Even a broken hood would have sufficient insulation to prevent a flashover.

The hood has also been fitted with stainless steel earthing straps to minimise corrosion.

The Window Seat

The Third International Rail Sleeper Conference will be held in Brisbane, on 23-28 September 1979. It has been convened by the Rail Sleeper Association (Australia) which was formed following the success of International Rail Sleeper Conferences in 1973 and 1976.

It will bring together specialists, both Australian and overseas, in the many inter-related aspects of the total rail-track structure, from below the ballast to above the rail. More than thirty papers are scheduled.

These include: The Contribution of Railways to the Total Australian Transport Task, by Dr Quinlan, Bureau of Transport Economics, Canberra; Steel Sleeper Manufacture, by D. C. Gillett, Broken Hill Pty Co. Ltd; Future Timber Availability from Australian Forests, by J. de Vries, Department of Primary Industry, Canberra; and British Railways High Speed Track, by M. C. Purbrick, Chief Civil Engineer, B.R.

Conference details are available from the Rail Sleeper Association (Australia), G.P.O. Box 4192, Sydney, 2001.

* * *

Prestressed concrete sleepers are to be used for the first time on 1,067 mm main-line track; and the contract for 5,000 such sleepers placed with Concrete Industries (Monier) Ltd for Queensland Railways also represents the first major use of concrete sleepers in that State. They will be manufactured at a new plant to be constructed at Darra, Brisbane.

Monier produced its one-millionth concrete sleeper for Australian National Railways in February this year. A new contract, for 300,000 sleepers for A.N.R., will be met by company plant in Port Augusta.

Monier is also supplying concrete sleepers to the Victorian Railways, and special ballastless sleepers for the Melbourne Underground Rail Loop Authority.

* * *

Additional coal wagons for QR. Vickers Ruwolt, Scotts of Ipswich Division, has secured a contract to build 110 VAH type aluminium bottom dump wagons for Queensland Railways. The contract stems from a need to expand the QR wagon fleet for the transport of export coal from Central Queensland and for current and projected increases in coal outputs.

Manufacture will be carried out at the Scotts' Ipswich Plant and the Division's new facility at Karrabin. The bogies, which are being manufactured under separate contract, will be supplied to Scotts by the Railway Department.

The long, low-set wagons will be fifteen metres over the coupling points, 2.8 metres over the side sills and 2.8 metres high. A Vickers team is engaged in a design and production methods analysis prior to construction of special equipment to ensure delivery of a prototype by July, and completion of the contract by February 1980.

* * *

Sydney's Eastern Suburbs Railway involved the installation of no less than 39 escalators at the various stations, at a cost of $8.2 m. All had to be of a heavy-duty type capable of handling a flow of passengers far above that encountered by normal escalator installations.

Maximum loads range from 8,000 to 12,888 per hour; and the "height of rise" ranges from 3.96 metres to 16.03 metres. The latter, at Martin Place Station, is roughly equal to a five-storey building. The Martin Place escalators are the longest in use in the Southern Hemisphere.

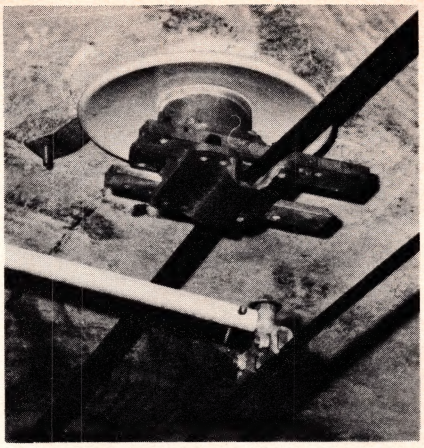
* * *

A new type of goods wagon bogie is being shown at the International Transport Exhibition at Hamburg, by Alusuisse of Zurich.

The new design has the effect of single-wheel suspension, and the transverse springing ensures better load distribution and smoother running.

In curves, the outer side of the bogie is subject to a greater load by centrifugal force; the two axles adjust radially and the wheels retain their normal position and do not "grind".

The spring arrangement also tends to suppress the rocking motion experienced so frequently in goods wagons, and so minimizes wear in rails and wheels.



High-standard insulation is vital with high voltages used underground.

Melbourne's Underground Rail Loop Authority has met that demand with the installation of specially designed Doulton insulators in its $367 million, four-tunnel complex, scheduled to come into operation progressively from October 1980.

Spaced every 15 metres, approximately 250 insulators are used in the box and circular sections in each tunnel, to support the overhead wiring. Based on the standard 203 mm diameter disc insulators, they are a safety valve for the two 1-ton tension, 10°C-40°C tolerance lines which carry the 1500 DC power supply through the 15 km of tunnel.

The stranded copper catenary wire holds the solid copper contact wire up in straight sections and supplies current in a parallel feeder arrangement. The contact wire is held in position on the curves by a stainless steel steady arm, anchored to the roof.

The insulators themselves are fixed to the tunnel roof with stainless steel masonry anchors, proof-tested to a 2-ton load. They are also fitted with sliding stainless steel brackets which can be moved across the tunnel to give seven different operating positions on either side. This, combined with a tolerance of plus or minus 160 mm from the centre of the tunnel, allows adjustment of the contact wire over curves or any deviation in the track.

Doulton Insulators Australia have been supplying insulators to the Victorian Railways for 50 years, and the MURLA insulator is basically a modified version of the standard disc insulator supplied to VicRail.

The porcelain hood has been extended to prevent any chance of

(continued on opposite page)

A new microwave communications system, recently approved for installation between Broadmeadow and Werris Creek will be the fourth to be brought into service by the Public Transport Commission of NSW. The other links are between Sydney/Orange; Sydney/Goulburn; and Broadmeadow/Grafton.

This new equipment is indicative of the PTC's determination to keep in the forefront of providing such efficient communications which already provide STD dialling throughout almost its entire network. This initiative started in the late 1850s when the railways were the first organisation in New South Wales to operate a telegraph communications system.

The PTC's latest microwave link will use the existing Broadmeadow communications complex, but it will be necessary to build a new terminal at Werris Creek, and four repeater stations at Broken Back Range (near Pokolbin); Muswellbrook Common; Mount Helen (near Murrurundi) and Mount Terrible (near Werris Creek).

Tenders for this addition to the PTC's communications network closed on 27 June, and a contract will be let soon for the new microwave link.

* * *

"QUIZ" Re-appears

Many will remember *Railway Quiz,* which was first printed in 1946 by the NSW Railways and contained questions and answers on all aspects of railway operations.

Revised editions were subsequently issued from time to time up to 1972, when the NSW Railways were replaced by the Public Transport Commission of NSW.

Now a new edition has been printed. It is called *Transport Quiz* and features comprehensive information relating to railways, trams and trolley buses, buses, ferries and hydrofoils.

Transport Quiz, a 54-page booklet with full-colour cover, contains the questions that are most frequently asked, and the answers are set out in non-technical terms.

It does not purport to be a textbook for transport experts, but contains items of interest to staff, to the one million people who use public transport in Sydney each working day, and the many others who want to know more about PTC operations — past, present and future.

Transport Quiz is on sale at 60 cents per copy from the Public Transport Commission Archives Section, Room B34, "Transport House", 11-31 York Street, Sydney, NSW 2000. Office hours are 9.00 a.m. to 12 noon, and 1.00 p.m. to 4.00 p.m.

If purchasing by mail, postal money orders or cheques for $1 (which includes postage) made payable to the "Public Transport Commission of NSW", should be sent to the above address.

* * *

(continued on page 29)

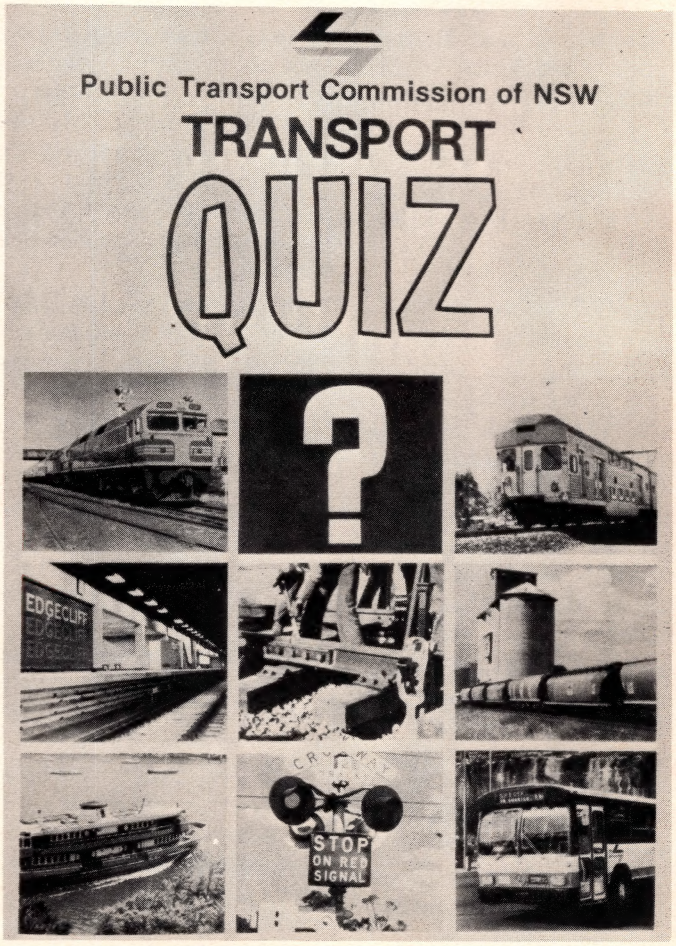
"Please Assist Disabled Passengers." For some time the Public Transport Commission of NSW has been investigating short-, medium- and long-range proposals which might be adopted to assist disabled passengers travelling on rail, bus and ferry services.

Whilst it could be considered that transport of the disabled should be the responsibility of other State or Federal authorities, the PTC has already made some progress in various spheres.

The latest innovation approved by the Commission is intended to assist disabled persons by indicating to them where seats on trains, buses and ferries might be made available.

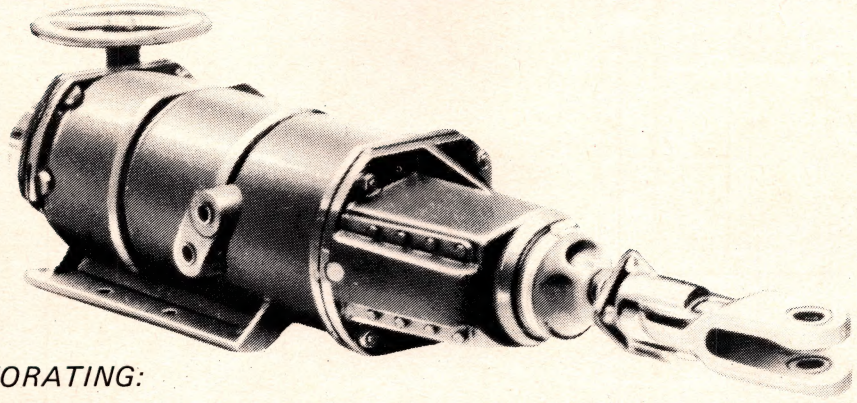
The signs will be displayed in a fixed position in each of the PTC vehicles adjacent to a seat so that disabled persons can proceed direct to that particular location knowing that a seat might be offered, if not already vacant.

* * *



WESTINGHOUSE

the TYPE `HSL´ BRAKE UNIT



INCORPORATING:

THE SPRING APPLIED PARKING BRAKE FEATURE

Another important advance in railway brake equipment design.

OPERATION:

During service operation the spring parking brake is held in the "brake release" position by the presence of air pressure in the spring brake chamber. Under this condition the service brake cylinder and slack adjuster are allowed to operate independently.

Venting air pressure from the spring brake chamber causes the spring parking brake to apply automatically.

FEATURES:

- **Unique manual quick release. Approximately 5 revolutions of shaft provide full "brake release" condition of the spring parking brake actuator.**
- **Automatic Re-set. Following manual operation of the spring parking brake, restoration of air pressure fully releases the brake and re-sets the mechanism for automatic operation.**
- **Manual Application. The spring parking brake may be applied by manual rotation of the shaft provided, following manual release.**
- **Proven Service Brake. The service brake cylinder and slack adjuster portion of the "HSL" unit is based on the "JSL" type, of which many thousands are in service throughout the world, and in excess of 3 500 units in Australia.**
- **Leakage Protection. Seals are arranged between brake cylinder and spring brake chamber such that leakage from either is vented to atmosphere. Thus leakage cannot interfere with normal brake operation.**

Railway Brake Division

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under Licence to General Electric Company U.S.A.

Less than a year ago, a new locomotive with more than 70 engineering innovations and design advances went into service in U.S.A.

The sum effect of these innovations raised the performance level of rail motive power and immediately began demonstrating a new standard of customer service. The New Series designation has since become synonymous with the finest diesel-electric technology in the world.

Through the combined efforts of A. Goninan & Co. Limited and General Electric Company U.S.A., this technology has now come to Australia. Goninan have built three 3600 hp New Series C36-7 locomotives for Hamersley Iron Pty. Ltd. under a technical assistance agreement with General Electric Company U.S.A. Each locomotive weighs 190 tonnes and is powered by a General Electric FDL series 16 cylinder diesel engine which has been specially developed for locomotive use and which provides improved fuel consumption and lower operating costs.

The result of this arrangement is truly innovative locomotives manufactured locally and destined to compile an equally impressive track record for the railroads of Australia.

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